

## PATENT ABSTRACTS OF JAPAN

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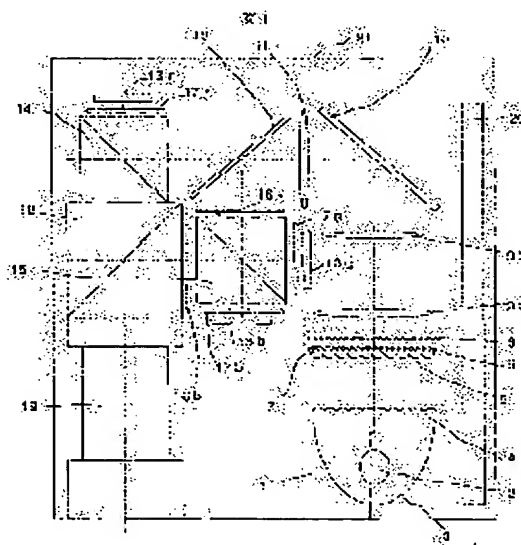
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## (54) IMAGE DISPLAY DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To enable a projector, which decreases in contrast as the lightness is increased and needs to have the lightness decreased to increase the contrast, to have both lightness and a high contrast.

SOLUTION: The angle of divergence of light made incident on a polarization beam splitter on the plane containing the incidence direction and reflection direction of a main light beam to and from the polarization beam splitter is made narrower than the angle of divergence of light irradiating a polarization beam splitter on a plane perpendicular to the above plane containing the main light beam.



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3.In the drawings, any words are not translated.

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**CLAIMS**

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[Claim(s)]

[Claim 1]

It is the image display device which has the light source unit which irradiates the light from the light source, the graphic-display component which carries out light modulation of the light irradiated by this light source unit based on an input picture signal, and forms the optical image according to a video signal, a color-separation composition means carry out color separation of the light irradiated by said light source unit, and compound the optical image of each color from said graphic-display component, and a projection means project the compounded optical image, Said color separation composition means is an image display device characterized by having been constituted including the polarization beam splitter, and constituting so that it may become it is perpendicular to said flat surface in the angle of divergence of the light by which incidence is carried out to said polarization beam splitter on a flat surface including the direction of incidence and the reflective direction of said polarization beam splitter of a chief ray, and narrower than the angle of divergence of the light irradiated by said polarization beam splitter on the flat surface containing a chief ray.

[Claim 2]

Said light source unit is an image display device according to claim 1 characterized by having a diaphragm means to restrict the angle of divergence of the light which irradiates said polarization beam splitter.

[Claim 3]

It has the illumination-light study system which consists of two or more lenses which irradiate the light from said light source unit at said graphic display component, The image display device according to claim 1 characterized by the principal point locations of two or more of said lenses differing at a flat surface including the direction of incidence and the reflective direction of said polarization beam splitter of a chief ray, and a flat surface perpendicular to this flat surface.

[Claim 4]

Said two or more lenses are image display devices according to claim 3 characterized by being constituted including a cylindrical lens.

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[Translation done.]

[0022]

It is clear that the reflection property's [ the reflection property when carrying out incidence of the P polarization light in a flat surface including the direction of incidence and the reflective direction of a chief ray from drawing 2 and ] when carrying out incidence of the P polarization light in a flat surface perpendicular to this flat surface including a chief ray degradation of the reflection property of the case in the flat surface which differ and includes the direction of incidence and the reflective direction of a chief ray is remarkable.

[0023]

Since a polarization shaft rotates by whenever [ to a reflector / incident angle ], or the reflective film carries out the laminating of many thin films and changes, this is for a reflection property to change in the reflective engine performance shifting according to an incident angle etc. Since the incident angle to a reflector comes size with the incident sense since 45 degrees of reflectors lean in the case of the incidence in the flat surface which includes the direction of incidence and the reflective direction of a chief ray especially, and it becomes Lycium chinense, a reflection property changes more notably.

[0024]

So, with the gestalt of this operation, the diaphragm 8 which restricts the angle of divergence of light so that width may be changed with 0.7, using length as 1 is established. Since there is little light of the include angle at which the reflection property in a flat surface including the direction of incidence and the reflective direction of the above mentioned chief ray deteriorates notably when G light and B light analyze light by PBS15 and R light analyzes light by PBS14 by this, the polarization light which should be reflected and which does not come out reflects and it is hard coming to generate the phenomenon which the polarization light which should be reflected does not reflect. Therefore, the remarkable degradation of the contrast by the leakage of the light of PBS could be prevented, and although brightness deteriorated about 15% according to a diaphragm compared with the case where it is based on the conventional technique without a diaphragm, contrast became better than twice. In addition, since, as for the angular distribution of the light of the light source, brightness falls so that an include angle spreads, compared with the magnitude of a diaphragm, the fall of brightness could be suppressed few and has improved contrast, without reducing brightness remarkably as a result.

[0025]

Although the diaphragm was prepared in restricting the angle of divergence of light in the case of the gestalt of the above-mentioned operation, this invention is not restricted to it. The principal point location of the collimator lens group by the side of the graphic display component of the approach, i.e., an illumination-light study system, of restricting the angle of divergence of the light of length and width to different magnitude is [ that what is necessary is just to make it differ by length and its side ] easily realizable by the conventional optical design. For example, although what is necessary is just to prepare one or more cylindrical lenses in the collimator lens group of an illumination-light study system, since it is a design-matter, specifically, it omits. Unlike the diaphragm shown in the gestalt of previous operation, since such a configuration has not restricted the light of the light source, it is bright,

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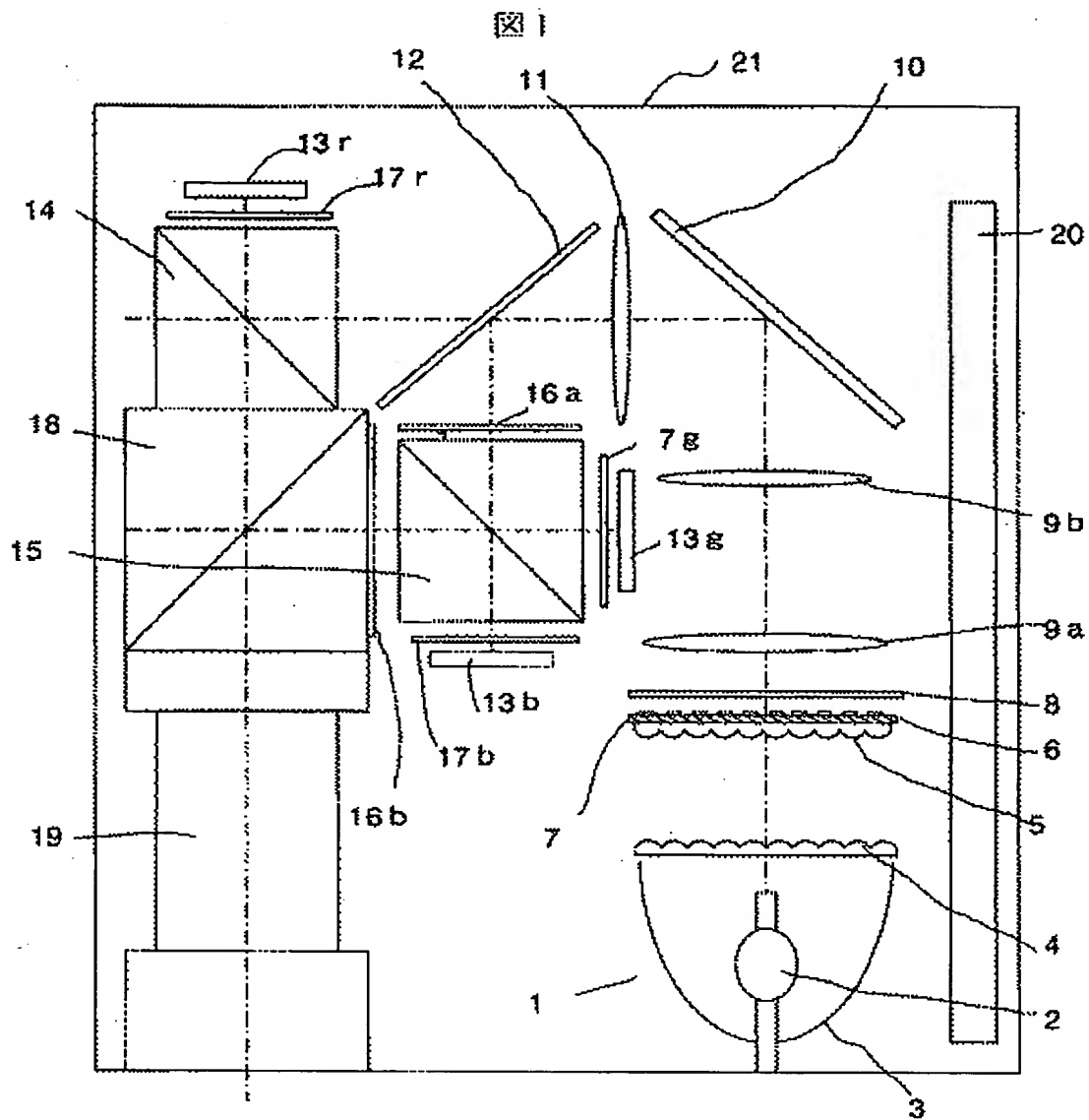


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